

REMARKS

Claims 1-21 are pending in the application. Claims 1-21 are rejected. Claims have been amended. No new matter is introduced with these amendments.

Reply to the Rejection of Claim 19-21 under 35 U.S.C. § 112, 1st Paragraph

The Examiner has rejected claims 19-21 as not being enabling for any textile having the properties claimed. Specifically, the Examiner states –

[T]he specification, while being enabling for textile modified by the specific process described in the claims, does not reasonably provide enablement for any textile having the properties claimed. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. For example, Viikari et al disclosed an equivalent process using enzyme oxidation. Applicant is not enabled for a product having equivalent properties which has been treated by the process of Viikari.

Claim 19 has been amended to clarify that the claimed invention is directed towards those textiles having a controlled quantity of aldehyde and carboxyl functionality in a ratio of at least 0.5. It is believed that this amendment overcomes the Examiner's rejection of claims 19-21 under 35 U.S.C. § 112, 1st paragraph. Withdrawal, therefore, of the rejection of those claims under 35 U.S.C. § 112, 1st paragraph is respectfully requested.

Reply to the Rejection of Claims 16 and 17 under 35 U.S.C. § 112, 1st paragraph

The Examiner has rejected claims 16 and 17 as failing to comply with the enablement requirement. Specifically, the Examiner states that “[t]here is no disclosure as to how the carbonyl or carboxyl functionalities are modified and or of the properties of the resultant products.” For the following reasons, Applicants respectfully traverse the Examiner's rejection of claim 21 under 35 U.S.C. § 112, 1st paragraph.

Modification of aldehyde and carboxyl groups is known in the art. For example, Rowland teaches impregnating a textile with a polymer solution that is capable of reacting with the hydroxyl groups of the textiles, as well as reacting with itself (a hydroxyl group reaction). The polymer is then cured, giving a crosslinked network, resulting in imparting durable press

properties, etc., as described in Rowland. Methylol groups in the additive polymer provide the functionality in Rowland.

In the present case, the claimed process provides reactive aldehyde and carboxyl groups on the textile itself. Similar to the reaction taught in Rowland wherein a polymer containing methylol functionality is reacted with the hydroxyl groups on the textile, any compound or polymer containing aldehyde and/or carboxyl functionality can now be brought in to react with those reactive groups on the textile itself.

For example, a textile prepared according to the process of the present invention can further be treated with a hydroxyl functional group containing polymers such as polyvinyl alcohol or starch (either sprayed or impregnated). This results in those functional groups reacting with the aldehyde and/or carboxyl groups, giving additional crosslinks and further benefits. Using these additives claimed in 16 and 17 to an unmodified textile or, *e.g.*, according to the process of Rowland, no effect would be provided.

It is believed that these remarks overcome the Examiner's rejection of claims 16 and 17 as failing to comply with the enablement requirement under 35 U.S.C. § 112, 1st paragraph. Withdrawal therefore of the rejection is respectfully requested.

Reply to the Rejection of Claims 4, 5, 7, 8, 12-15 and 18 under 35 U.S.C. § 112, 2nd paragraph

The Examiner has rejected claims 4, 5, 7, 8, 12-15 and 18 as being indefinite. Specifically, the Examiner states –

Claim 4 recites “the modified cellulosic textile of claim 2 wherein there is no antecedent basis for said textile in claim 2. Claim 2 claims a process. There is no basis in claim 1 for “the modified textile” as claimed in claim 18. “The” should be replaced with “A”.

Claim 4 has been amended to refer to the process instead of the textile. Claim 4 has also been amended to insert the term ‘wherein’ for clarity. Claim 18 has been amended to delete the term “The”. Further, claims 14 and 15 have been amended to refer to a ‘process’ instead of a ‘method’, consistent with the remaining claims. Claim 15 has also been amended to correct a misspelling. It is believed that these amendments overcome the Examiner's rejection of claims

14, 5, 7, 8, 12-15 and 18 under 35 U.S.C. § 112, 2nd paragraph. Withdrawal, therefore, of the rejection of those claims under 35 U.S.C. § 112, 2nd paragraph is respectfully requested.

Reply to the Rejection of Claim 18-21 under 35 U.S.C. § 102(b)

The Examiner has rejected claims 18-21 as being anticipated by U.S. Patent No. 4, 277,243 to Rowland ("Rowland"). Specifically, the Examiner states –

Rowland discloses a textile which has durable press properties and hydrophilic properties which are better than an untreated cellulosic textile. The abstract states that the cotton-containing fabric treated by his process has a durable-press appearance, improved abrasion resistance and breaking strength. Column 4 line 38 states that the fabrics have attractive levels of hydrophilic characteristics. (hydrophilic means water or moisture loving.) In column 4 lines 64-68 he states, "Hydrophilic characteristics or textile fibers are readily assessed in terms of moisture regain and water of imbibation. . . . " These two sections of the disclosure anticipate the instant claims.

For the following reasons, Applicants respectfully traverse the Examiner's rejection of claims 18-21 under 35 U.S.C. § 102(b).

Referring to Rowland therein is disclosed a process for producing durable-press cotton fabrics with improved balances of textile properties. According to the process of Rowland, an aqueous solution is applied to cellulosic textile (col. 3, lines 43-44). This solution contains three primary ingredients, two of which are conventional and the third being the one that provides the special effects of the Rowland invention (col. 3, lines 44-46). The conventional ingredients are (1) at least one water-soluble crosslink-forming compound possessing two or more methylol groups, and (2) a Brønsted acid catalyst or a Brønsted acid-generating metal salt (col. 3, lines 47-51). The third critical component in the Rowland invention is a phosphate salt or mixture of phosphate salts (col. 3, lines 51-53). After soaking the textile with the aqueous solution, it is heated or cured to activate the acid catalyst (col. 3, lines 54-59; col. 6, lines 60-65).

The methylol reagent undergoes etherification reactions with the cellulosic substrate with the formation of crosslinks (col. 5, lines 1-5). The acid catalysts simply catalyze this reaction between the methylol reagent and the hydroxyl groups in the cellulosic substrate (col. 5, lines 5-7). It is believed that the phosphate salts serve to influence the chemical reaction or the physical aspects of the reaction in the textile (col. 5, lines 7-11).

In contrast to Rowland, the present invention is directed to modification of the cellulosic textile itself. No reagent is used wherein the textile crosslinks with the reagent. Instead, in the present invention, the oxidation process allows for manipulation of the effective levels of aldehyde and carboxyl functionality on the cellulosic textile. By controlled oxidation of the cellulosic textile, aldehyde functionality is generated such that it is able to crosslink with hydroxyl groups on neighboring cellulose chains, effectively 'self-crosslinking'. Such a process is not taught or suggested by Rowland. Instead, Rowland is a modification of conventional crosslinking techniques referred to in paragraphs 0025 and 0030 of the present published application.

Claim 18 depends from claim 1. Both independent claims 1 and 19 require that a controlled quantity of aldehyde and carboxyl functionality in a ratio of greater than about 0.5 based on the moles of each functionality be imparted to the textile. According to the present invention, this is accomplished by oxidation of the cellulosic textile. As Rowland is a modification of conventional crosslinking techniques that does not address manipulation of effective levels of aldehyde and carboxyl functionality, the process of Rowland could never achieve the claimed controlled quantity of aldehyde and carboxyl functionality of the present invention.

It is believed that these remarks overcome the Examiner's rejection of claims 18-21 as being anticipated by Rowland. Withdrawal of the rejection is respectfully requested.

Reply to the Rejection of Claim 18 and 20 under 35 U.S.C. § 103(a)

The Examiner has rejected claims 18 and 20 as being obvious in view of U.S. Patent No. 4, 277,243 to Rowland ("Rowland"). Specifically, the Examiner states –

The subject matter would have been obvious to the skilled artisan because the patentability of a product by process claim does not depend on its method of production and where the examiner has found a similar product, the burden rests with the applicant to prove that the product is patentably distinct. See *In re Thorpe*, 227 USPQ 964 (CAFC 1985); *In re Marosi et al*, 218 USPQ 289; *In re Pilkington*, 162 USPQ 145.

"The lack of physical description in a product-by-process claim makes the determination of the patentability of the claim more difficult, since in spite of the fact that the claim may recite only process limitations, it is the patentability of the product claimed and not the process that must be established. We are therefore of

the opinion that when the prior art discloses a product which reasonably appears to be identical with or only slightly different than a product claimed in a product-by-process claim, a rejection based alternatively on either section 102 or 103 of the statute is eminently fair and acceptable. As a practical matter, the Patent Office is not equipped to manufacture products by the myriad processes put before it and then obtain prior art products and make physical comparisons therewith.” In re Brown, 173 USPQ 685, 688 (CCPA 1972).

For the following reasons, Applicants respectfully traverse the Examiner’s rejection of claims 18 and 20 under 35 U.S.C. § 103(a).

Rowland was discussed above in the anticipation argument, those remarks being incorporated herein. As noted above, Rowland teaches a modification of conventional crosslinking techniques wherein the cellulosic textile is crosslinked with a compound possessing two or more methylol groups. In contrast, the process of the present invention provides for self-crosslinked cellulosic textiles. Accordingly, the products of each invention differ from one another and therefore would provide different characteristics. Regarding the lack of physical description, the products of claim 18 and 20 require that the textile have a controlled quantity of aldehyde and carboxyl functionality in a ratio of greater than about 0.5 based on the moles of each functionality, *i.e.*, a physical description of the textile is provided. Rowland does not teach or suggest such a product. For at least these reasons it cannot be said that the products are similar.

It is believed that these remarks overcome the Examiner’s rejection of claims 18 and 20 as being obvious in view of Rowland. Withdrawal of the rejection is respectfully requested.

Reply to the Rejection of Claims 1-12 and 18-21 under 35 U.S.C. § 103(a)

The Examiner has rejected claims 1-12 and 18-21 as being obvious in view of International Publication No. WO 99/23117 to Viikari *et al.* (“Viikari”). Specifically, the Examiner states –

A process for preparing oxidized cellulose, which comprises bringing a cellulose-containing material into contact with a reactant, such as 2,2,6,6-tetramethylpiperidine-1-oxyl, (TEMPO), which is applicant’s mediator as claimed in at least claims 4, 7 and 8, is disclosed in the abstract. On page 5 patentee states that the method can be employed for oxidizing cellulosic textile fibers, yarns and fabrics, selected from cotton, hemp, ramie and viscose. Oxidation will provide fibers, yarns and fabrics with modified properties selected from the group of handle, drapability, softness and water absorbency. Said textile materials and

garments prepared therefrom read on product claims 18-21. In Example 1 on page 5 lines 23 et seq., patentee exemplifies a process of chemical oxidation of pine craft pulp using aqueous sodium hypochlorite and sodium bromide and TEMPO, which are the reagents claimed in the instant method claims. Table 1 on page 6 discloses that both carboxylic acid groups and [sic, and] aldehyde groups are formed on the cellulosic substrate.

The reference differs from the instant claims because it does not give an example of treating a textile material. Accordingly, it does not disclose the appropriate percentage of chemicals to use in the oxidation process as applied to textiles. It would have been obvious to the skilled artisan that applicant's claims are a variation of the process taught by Viikari et al because they specifically [sic, state?] that it may be used for the applicant's intended purpose, that is to impart improved properties to cellulosic textiles including improved water absorbency (wicking) as claimed, and because it states on page 2 lines 19 et seq, "A method for selective oxidation is provided, which gives rise to the formation of carboxylic and carbonyl groups at desired ratios in the cellulose. Accordingly, this is a clear teaching that one skilled in the art, reading the disclosed method, can adjust the oxidation parameters to obtain any ratio of carbonyl and carboxylic acid groups desired in the cellulosic textile.

For the following reasons, Applicants respectfully traverse the Examiner's rejection of claims 1-12 and 18-21 under 35 U.S.C. § 103(a).

Referring to Viikari therein is disclosed a method for the modification of cellulose. The method involves selective oxidation of carbohydrates in cellulosic fibers whereby carboxylic and carbonyl groups are formed at desired ratios in the cellulose (p. 2, lines 10-21; p. 4, lines 27-29). By selective oxidation, Viikari is referring to the enzymatic oxidation of TEMPO (p. 2, line 29 – p. 3, line 2).

Viikari provides as a reference against its enzymatic oxidation an example of TEMPO mediated oxidation of kraft pulp by chemical oxidation (see Example 1). As seen in Table 1 of Viikari (p. 6), the chemical oxidation reference process provides a 30-fold increase in carboxylic groups (from 30 groups before oxidation to 900 after) versus only a 5-fold increase in carbonyl (*i.e.*, **both** ketones and aldehyde) groups (from 1 group before oxidation to 5 after). This effectively teaches one skilled in the art to react the carbohydrates on the cellulose to its end carboxylic functional group. In contrast, the present invention teaches controlling the amount of oxidant, thereby producing a controlled quantity of aldehyde and carboxyl functionality. Because Viikari teaches providing a large amount of oxidant so that the cellulose is oxidized to its end carboxylic groups, one skilled in the art is provided with no motivation to control the amount of

oxidant. Without controlling the amount of oxidant in the amount taught in the present invention, one cannot achieve the claimed ratio of aldehyde to carboxyl functionality. Without the claimed ratio of aldehyde to carboxyl functionality, one cannot achieve the 'self-crosslinking' of the cellulose fibers, thereby providing the beneficial properties of the present invention's products. For at least these reasons, Viikari does not teach or suggest the present invention, nor does Viikari provide one skilled in the art to control the amount of oxidant in order to achieve the claimed ratio of aldehyde to carboxyl functionality.

It is believed that these remarks overcome the Examiner's rejection of claims 1-12 and 18-21 as being obvious in view of Viikari. Withdrawal of the rejection is respectfully requested.

Reply to the Rejection of Claim 13 under 35 U.S.C. § 103(a)

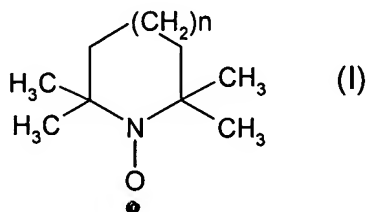
The Examiner has rejected claim 13 as being obvious in view of Viikari as applied to claims 1-12 and 18-21 above, and further in view of U.S. Patent No. 6,409,881 to Jaschinski ("Jaschinski"). Specifically, the Examiner states –

Viikari et al is set forth as applied in the above rejection as disclosing hypohalite oxidation of celluloses using TEMPO as the nitroxyl mediator. They do not describe 4-acetoamido TEMPO as a mediator. Jascinski discloses that 4-Acetoamido TEMPO is equivalent to TEMPO as a mediator in the hypohalite oxidation [*sic*, of] the hydroxyl groups at C6 of the glucose units on cellulose to aldehyde and/or carboxyl groups. See col 13 lines 4-36, and col 14 lines 55 et seq. It would have been obvious to the skilled artisan to substitute 4-acetoamido TEMPO for TEMPO in the process of Viikari since Jascinski teaches that they are equivalent for the purpose of mediating the hypohalite oxidation of cellulose.

For the following reasons, Applicants respectfully traverse the Examiner's rejection of claim 13 under 35 U.S.C. § 103(a).

Viikari was discussed above, those remarks being incorporated herein. Referring to Jaschinski, therein is disclosed a method of producing metal-crosslinkable oxidized cellulose-containing fibrous materials. The fibrous material is produced by first oxidizing the OH functions at the glucose C-6 of the cellulose in cellulose-containing fibrous material into aldehyde and/or carboxy groups (col. 11, lines 40-44). This oxidized fibrous material is then crosslinked with a metal-containing crosslinking agent selected from transition metals of the groups IVa, Va, VIa, VIIa and VIIIa, Zn and Al (col. 11, lines 45-48).

“Oxidation of the starting material may be effected with any oxidizing agent that oxidizes the OH functions at the C(6) of the glucose unit of the cellulose . . . into aldehydes and/or carboxyl groups” (col. 12, lines 5-9). Such oxidizing agents include hypochlorite, hypobromite, hydrogen peroxide, nitroxy compounds, particularly TEMPO oxidizing systems, and suitable combinations thereof (col. 12, lines 9-21). Preferred oxidation systems are represented by the following formula I –



(col. 13, lines 4-28). The above formula I compounds include the optionally substituted TEMPO compounds (col. 13, lines 31-36). These TEMPO compounds can be hydroxy-, amino- or amido-substituted, *e.g.*, 4-hydroxy TEMPO and 4-acetamido TEMPO (col. 14, lines 55-60; col. 15, lines 8-10). The nitroxy compound is used in an amount of 0.005 to 70-wt. % relative to the dry weight of the fibrous material (col. 13, lines 60-65).

Crosslinking of the oxidized fibers with a metal preferably occurs after oxidation, or, optionally, after the chemical treatment and/or washing stage to prevent the oxidizing agent from oxidizing the metal-containing crosslinking agent in use (col. 15, lines 42-46). Treatment with the crosslinking agent is possible during or just after the production of the oxidized fibrous material (col. 15, lines 46-48).

The total content of aldehyde and/or carboxyl groups at C-6 in the oxidized cellulose-containing fibrous material of Jaschinski is preferably more than 50 or more than 100 $\mu\text{mol/g}$ dry weight (oven-dried) of the fibrous material, particularly more than 150 $\mu\text{mol/g}$. Greater preference is given to values of more than 200 $\mu\text{mol/g}$, particularly more than 250 $\mu\text{mol/g}$ (col. 8, line 65 – col. 9, line 3).

As shown above, Jaschinski is directed towards a method of producing metal-crosslinkable oxidized cellulose-containing fibrous materials. The Jaschinski method requires a first step of oxidizing the starting material with any oxidizing agent that oxidizes the OH functions at the C-6 of the glucose unit of the cellulose into aldehydes and/or carboxyl groups. The oxidizing agents include hypochlorite, hypobromite, hydrogen peroxide, nitroxy compounds,

particularly TEMPO oxidizing systems and suitable combinations thereof. The total content of aldehyde and/or carboxyl groups at C-6 in the oxidized cellulose-containing fibrous material of Jaschinski is preferably more than 50 $\mu\text{mol/g}$ dry weight (oven-dried) of the fibrous material. The second step of the Jaschinski method is to crosslink the oxidized fiber with metal to obtain the inventive products.

Like Rowland, Jaschinski does not provide a process whereby the cellulosic fibers are 'self-crosslinking'. Further, Jaschinski does not teach or suggest controlling the amount of oxidant so that a controlled quantity of aldehyde and carboxyl functionality is provided, particularly in the amount claimed. Accordingly, Jaschinski adds nothing to Viikari. One skilled in the art having both Jaschinski and Viikari before them would not be provided with the motivation to impart a controlled quantity of aldehyde and carboxyl functionality to textile. For at least these reasons, Viikari in view of Jaschinski does not render claim 13 unpatentable.

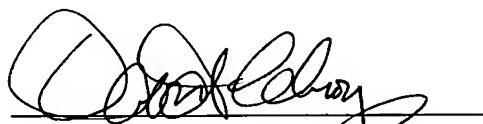
It is believed that these remarks overcome the Examiner's rejection of claim 13 as being unpatentable over Viikari in view of Jaschinski. Withdrawal of the rejection is respectfully requested.

It is believed that the above remarks overcome the Examiner's rejections of the claims under 35 U.S.C. §§ 112, first paragraph, 102(b) and 103(a) as indicated herein above. Withdrawal of the rejections is therefore respectfully requested. Allowance of the claims is believed to be in order, and such allowance is respectfully requested.

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